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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,356	03/02/2004	Yuichi Kawahata	1344.1133	9386

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EXAMINER	
LIU, LI	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 11/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/790,356	KAWAHATA, YUICHI
	Examiner	Art Unit
	Li Liu	2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/02/04, 05/11/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 03/02/2004 and 05/11/2005 are being considered by the examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Barbarossa et al (US 6,392,807).

Barbarossa et al disclose a wavelength dispersion compensator, comprising:

an optical component (Figure 7 and Figure 3) including a device (340 in Figure 7 and Figure 3) having two reflective surfaces which are opposed and parallel to each other, and provided with a demultiplexing function (Figures 1 and 2) in which a light condensed in the one-dimensional direction is incident between the reflective surfaces of said device (Figure 2), and a part of said incident light is transmitted through one of the reflective surfaces while said incident light being multiple-reflected on the reflective surfaces (the lights are multi-reflected between 224 and 222 in Figure 2, and transmitted out of 222), to be emitted, and said emitted light interferes mutually (column

4 line 5-25), so that optical beams, traveling directions of which are different from each other according to wavelengths (column 4 line 56 to column 5 line 4), are formed; and

a reflector (356 in Figured 3 and 7) reflecting optical beams of respective wavelengths emitted from one of the reflective surfaces of said optical component in different directions to return the optical beams to said optical component, respectively,

wherein a reflection prism (706 in Figure 7) for changing a propagation direction of light to an opposite direction is provided on an optical path between one of the reflective surfaces of said optical component and said reflector.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3,5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 7,099,531).

1). With regard to claim 1, Chen et al discloses an optical component (Figures 7 and 9) including a device having two reflective surfaces (the 64 and 65 in Figure 7) which are opposed and parallel to each other, and provided with a demultiplexing function in which a light condensed in the one-dimensional direction is incident between the reflective surfaces of said device, and a part of said incident light is transmitted through one of the reflective surfaces (e.g, 65 in Figure 7F) while said incident light

being multiple-reflected on the reflective surfaces, to be emitted, and said emitted light interferes mutually (column 8 line 9-54), so that optical beams, traveling directions of which are different from each other according to wavelengths (column 8 line 55-66), are formed,

wherein said device includes: a first side surface (63 in Figure 7F) substantially perpendicular to each of the reflective surfaces (64 and 65 in Figure 7F); and a second side surface (82 in Figure 7F) opposed to said first side surface and tilted relative to a perpendicular direction of the respective reflective surfaces, and said incident light is transmitted through said first side surface (63 in Figure 7F) and, then, the light reflected by said second side surface (82 in Figure 7F) is multiple-reflected on the reflective surfaces (64 and 65 in Figure 7F).

But Chen et al does not teach that the incident light is transmitted through said first side surface (63 in Figure 7F) and, then passes between the reflective surfaces to be reflected by said second side surface.

However, how and where to place the second side surface is just a matter of design choice. The structures of Figure 7F of Chen et al and Figure 2 of applicant give exactly same results. Follwing is explanation:

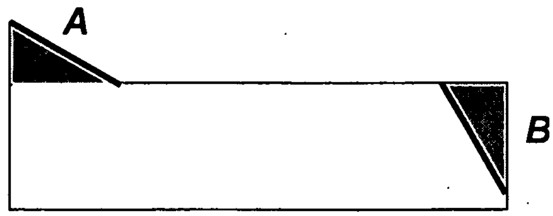


Figure 1

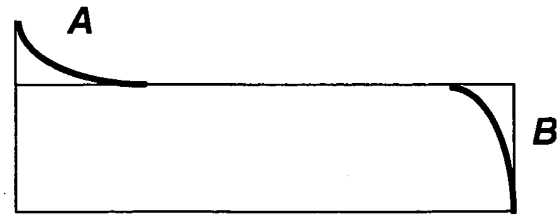
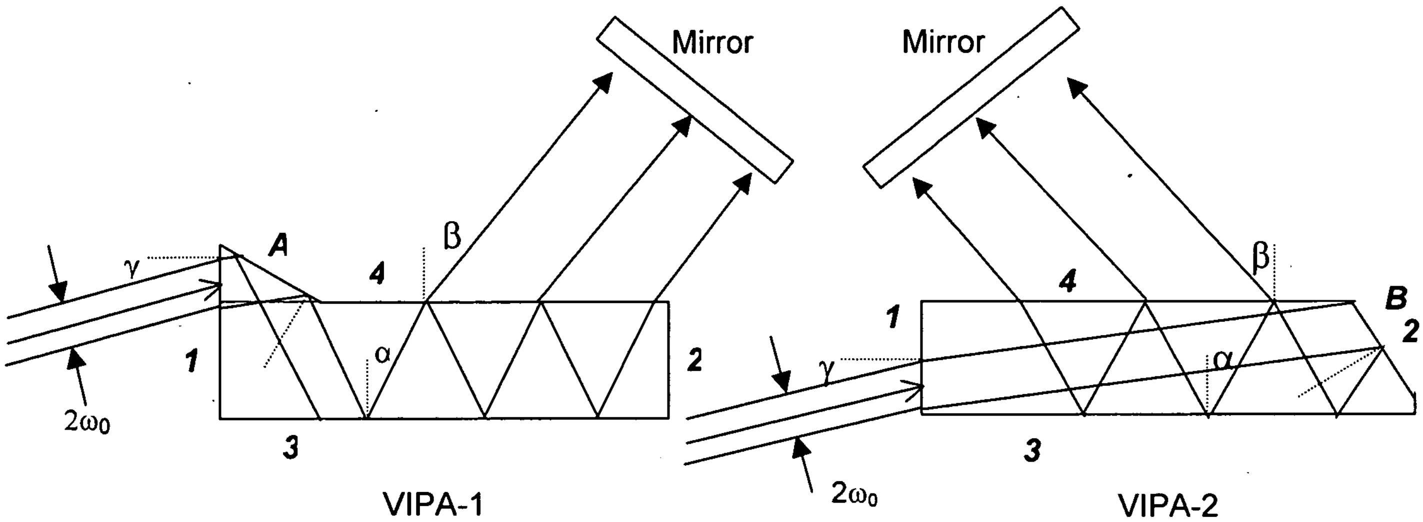


Figure 2



Figures 1 and 2 show that a "wedge" at "B" is cut and placed at "A". The thick lines indicate the reflection surfaces. The position A is the design from Chen et al, and the position B is the design from applicant. The "A" and "B" have the same shape. VIPA-1 is for Chen et al's design, and VIPA-2 is for applicant's design. The incident angle γ to the surface 1 is the same for both situations. The input light beams have the same waist $2\omega 0$, therefore the edge loss and mode loss are the same. Since the curvatures of "A" and "B" are exactly the same (See Figures 1and 2), according to the principle of geometrical optics, the reflection angles 'α' from the two reflective surfaces are the same for VIPA-1 and VIPA-2. And the refraction angle 'β' exiting from the surface 4 is the same for both VIPA-1 and VIPA-2 also.

Then according to the principle of wave optics, constructive interference occurs between all beams emerging from the surface 4 if the optical path delay between

successive reflections, i.e. .Δp, equals an integer multiple of the wavelength (λ) of light entering the optical VIPA:

$\Delta p = 2hn \cos \alpha = m\lambda$. (1)

or $4h^2(n^2-\sin^2\beta)=m^2\lambda^2$ (2)

where n is the index of refraction of material forming the VIPA.

α is the angle of incidence on the surface 4 of light reflecting internally inside the VIPA.

β is the angle of refraction of light exiting the VIPA through the surface 4.

h is the thickness of the VIPA.

m is the order of interference.

The angular dispersion capability of the VIPA can be derived from equation (2).

$$\frac{\delta\beta}{\delta\lambda} \approx \frac{n^2 - \sin^2\beta}{\lambda \sin\beta \cos\beta}$$

Since the absolute value of β is the same for VIPA-1 and VIPA-2, both design have the same angular dispersion capability. Then, the lights emitted from the VIPA are reflected by the free-form surface mirror, and return to the VIPA plate, and finally come out from surface 1. (In above analysis, a flat reflective surface as in Figure 1 is used for demonstration, for the case of Figure 2, same conclusion as the above can be derived).

The limitations in claim 1 do not define a patentably distinct invention over that in Chen et al since both the invention as a whole and Chen et al are directed to input the light from the side surface. The losses are the same and angular dispersion capability

is exactly the same. Therefore, to put the "wedge" at position "A" or reflect light from "B" would have been a matter of obvious design choice to one of ordinary skill in the art.

2). With regard to claim 2, Chen et al discloses all of the subject matter as applied to claim 1 above. And Chen et al further discloses wherein a mirror portion having a reflective surface (82 in Figure 7) shaped so that the reflected light can be condensed in the one-dimensional direction is formed on at least a part of said second side surface.

As demonstrated in claim 1, how and where to place the second side surface (a curved surface or flat surface) is just a matter of design choice. The limitations in claim 2 do not define a patentably distinct invention over that in Chen et al since both the invention as a whole and Chen et al are directed to input the light from the side surface. The losses are the same and angular dispersion capability is exactly the same. Therefore, to put the "wedge" at position "A" or reflect light from "B" (see Figures plotted in claim 1) would have been a matter of obvious design choice to one of ordinary skill in the art.

3). With regard to claim 3, Chen et al discloses wherein a flat plate mirror (82 in Figure 7F) that is tilted relative to a perpendicular direction of said reflective surfaces is formed on said second side surface.

4). With regard to claim 4, Chen et al discloses the optical component, further including; a first optical system (71 in Figure 9, column 7 line 4-7) giving the light condensed in the one-dimensional direction to the first side surface of said device.

5). With regard to claim 6, Chen et al discloses all of the subject matter as applied to claims 1 and 4 above, but Chen et al does not expressly disclose wherein said first optical system includes a bifocal lens in which focal lengths of orthogonal axes are different from each other, and said bifocal lens is formed on the first side surface of said device, and a light emitted from an optical fiber is given to the first side surface of said device via said bifocal lens.

However, as admitted by the applicant: "the bifocal lens 18 is a **known** lens designed so that focal lengths of the orthogonal x- and y-axes are different from each other", the bifocal lens has been widely used in the optical instrument. Since the surface 1 has a rectangular shape, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the bifocal lens as widely used in the art so that the lights can be efficiently focused to the desired reflective surface.

6). With regard to claim 7, Chen et al discloses the optical component, further including a second optical system (67 in Figures 4 and 8, [0086]) condensing optical beams of respective wavelengths emitted from one of the reflective surfaces of said device in different directions, respectively, on different positions (Figures 4 and 8, [0087], equation 3 and Figure 3A).

7). With regard to claim 8. Chen et al discloses a wavelength dispersion compensator (Figures 7 and 9), comprising:

an optical component including a device having two reflective surfaces (the 64 and 65 in Figure 7) which are opposed and parallel to each other, and provided with a demultiplexing function (Figures 3 and 4, and equation 3) in which a light condensed in

the one-dimensional direction is incident between the reflective surfaces of said device, and a part of said incident light is transmitted through one of the reflective surfaces (e.g., the surface 65 in Figure 7F) while said incident light being multiple-reflected on the reflective surfaces (Figure 7A), to be emitted, and said emitted light interferes mutually (column 8 line 9-54), so that optical beams, traveling directions of which are different from each other according to wavelengths (column 8 line 55-66, equation 3), are formed; and

a reflector (68 in Figures 4 8) reflecting optical beams of respective wavelengths emitted from one of the reflective surfaces of said optical component in different directions to return the optical beams to said optical component, respectively,

wherein in said optical component, said device includes: a first side surface (63 in Figure 7F) substantially perpendicular to each of the reflective surfaces (64 and 65 in Figuer 7F); and a second side surface (82 in Figuer 7F) opposed to said first side surface and tilted relative to a perpendicular direction of the respective reflective surfaces, and said incident light is transmitted through said first side surface, and the light reflected by said second side surface is multiple-reflected on the reflective surfaces (Figure 7F).

But Chen et al does not teach that the incident light is transmitted through said first side surface (63 in Figure 7F) and, then passes between the reflective surfaces to be reflected by said second side surface.

However, as demonstrated in Claim 1, how and where to place the second side surface is just a matter of design choice. The limitations in claim 8 do not define a

patentably distinct invention over that in Chen et al since both the invention as a whole and Chen et al are directed to input the light from the side surface. The losses are the same and angular dispersion capability is exactly the same. Therefore, to put the "wedge" at position "A" or reflect light from "B" (see Figures plotted in claim 1) would have been a matter of obvious design choice to one of ordinary skill in the art.

8). With regard to claim 9, Chen et al discloses all of the subject matter as applied to claim 8 above. Chen et al further discloses the wavelength dispersion compensator, further comprising:

a first optical system (71 in Figure 9, column 7 line 4-7) giving the light condensed in the one-dimensional direction to said optical component; and

a second optical system (67 in Figures 4 and 8, [0086]) condensing optical beams of respective wavelengths emitted from one of the reflective surfaces of said optical component in different directions, respectively, on different positions on a reflective surface of said reflector (Figures 4 and 8, [0087], equation 3 and Figure 3A).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 7,099,531) as applied to claim 1 above and in view of Barbarossa et al (US 6,392,807).

Chen et al discloses wherein said first optical system includes: a collimate lens (71 in Figure 9, column 7 line 4-7) converting a light emitted from an optical fiber into a parallel light.

But Chen et al does not expressly discloses a line focal lens condensing the parallel light converted by said collimate lens in the one-dimensional direction, and the light emitted from said line focal lens is given to the first side surface of said device.

However, such a line focus lens has been widely used in the art for focusing the lights, Barbarossa et al discloses such kind of lens (350 in Figure 3 and Figures 7a and 7b, column 5 line 20-22, and column 8 line 13).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the line focus lens as widely used in the art so that the lights can be properly focused and the coupling efficiency can be increased.

7. Claim 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbarossa et al (US 6,392,807) as applied to claim 10 above and in view of Chen et al (US 7,099,531).

Barbarossa et al discloses all of the subject matter as applied to claim 11 above. But Barbarossa et al does not discloses wherein in said optical component, said device includes: a first side surface substantially perpendicular to each of the reflective surfaces; and a second side surface opposed to said first side surface and tilted relative to a perpendicular direction of the respective reflective surfaces, and said incident light is transmitted through said first side surface and, then, passes between the reflective surfaces to be reflected by said second side surface, and the light reflected by said second side surface is multiple-reflected on the reflective surfaces.

However, Chen et al discloses that the device includes: a first side surface (63 in Figure 7F) substantially perpendicular to each of the reflective surfaces (64 and 65 in

Figure 7F); and a second side surface (82 in Figure 7F) opposed to said first side surface and tilted relative to a perpendicular direction of the respective reflective surfaces, and said incident light is transmitted through said first side surface (63 in Figure 7F) and, then, the light reflected by said second side surface is multiple-reflected on the reflective surfaces (64 and 65 in Figure 7F).

But Chen et al does not teach that the incident light is transmitted through said first side surface (63 in Figure 7F) and, then passes between the reflective surfaces to be reflected by said second side surface.

However, as demonstrated in Claim 1, how and where to place the second side surface is just a matter of design choice. The limitations in claim 8 do not define a patentably distinct invention over that in Chen et al since both the invention as a whole and Chen et al are directed to input the light from the side surface. The losses are the same and angular dispersion capability is exactly the same. Therefore, to put the "wedge" at position "A" or reflect light from "B" (see Figures plotted in claim 1) would have been a matter of obvious design choice to one of ordinary skill in the art.

Since Chen et al provide a low loss system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the side surface for inputting light as taught by Chen at al so that the mode loss and insertion loss can be reduced.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Okasa et al (US 20050041921) discloses Variable wavelength dispersion compensator.

Lin et al (US 20030215182) discloses a method and system for compensation of amplifier gain slope and chromatic dispersion utilizing a virtually imaged phased array.

Shirasaki et al (US 6304382) discloses a virtually imaged phased array (VIPA) having a varying reflectivity surface to improve beam profile.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
November 15, 2006

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER